Retirement and Fixed Costs to Work: An Empirical Analysis

Kolodziejczyk, Christophe

Publication date:
2006

Document version
Publisher's PDF, also known as Version of record

CAM

Centre for Applied Microeconometrics

Department of Economics University of Copenhagen

http://www.econ.ku.dk/CAM/

Retirement and Fixed Costs to Work: An Empirical Analysis

Christophe Kolodziejczyk

2006-09

The activities of CAM are financed by a grant from The Danish National Research Foundation

Retirement and Fixed Costs to Work: an empirical analysis*

Christophe Kolodziejczyk†

University of Copenhagen

Abstract

In this paper we study consumption around the age of retirement. We consider a model where consumption and leisure are non-separable and retirement is endogenous. We consider the case where non-separabilities come from the existence of fixed costs to work. We show that the existence of unobserved heterogeneity related to these non-separabilities will lead to biases of the OLS estimators of structural parameters of demand systems conditioned on retirement. These estimates give bounds to the true fixed costs. We estimate the model with French data and compute the bounds of these structural parameters.

Keywords: Retirement, Fixed costs to work, Correlated random coefficient model, Bias

JEL Codes: C13, C21, D12, J26

*I thank Martin Browning and Ramses Abul Naga for their useful suggestion. This research has received financial support from the Economics of Ageing Research Training Network AGE , project number AGE 25519. I am responsible for any error.

†Center for Applied Microeconometrics, Department of Economics, University of Copenhagen, Studiestræde 6, 1455 Copenhagen, Denmark. E-mail: Christophe.Kolodziejczyk@econ.ku.dk

1 Introduction

As documented by Hurd[13], over the past twenty years there has been an increasingly interest in the economics of ageing people mostly because of the change in the age structure of developed countries. Since the elderly contribute to a large fraction of the net wealth of the households the consumption behavior of this type of population may have a large impact on aggregate wealth. Moreover this group of people may be a useful unit of observation to validate economic theory. Particularly the standard model of consumption allocation over the life-cycle predicts that people will dissave their assets when they reach retirement, a prediction which seems not confirmed by US and UK data since we observe a drop in consumption around this period (see Banks et al. [1] for the UK and Bernheim [2] for the US). Although we observe a drop in consumption this does not necessarily mean that these people experience a welfare loss. For these reasons, the description of the saving behavior of people around retirement is an important policy issue.

There have been several explanations for this so-called savings-retirement puzzle. Banks et al. argue that this drop in consumption may be explained by demographic changes, non-separabilities in consumption and leisure and some work related expenses which are no longer present once retired. Once they have controlled for these factors they find that the puzzle is still unsolved and conclude that agents may face unfavorable information at retirement which constrain them to revise their savings.

As pointed out by Hurd and Rohwedder[14], consumption smoothing occurs if the change in the other determinants of the marginal utility of consumption change gradually. If we introduce non-separabilities between consumption and leisure, people will smooth consumption if they are able to adapt their labour supply continuously over time. But for most people who retire this change in labour supply is discontinuous, typically from full-time to non-participation. When we relax the assumption of additive separability between consumption and leisure, then the discontinuity in the change of work hours at retirement will have a non-marginal impact on consumption. If for instance consumption and leisure are substitutes then this increase in leisure will cause a discontinuous decrease in consumption in order to keep marginal utility of consumption constant. Second people at retirement may have more time for domestic production and could then decrease consumption of market goods while still maintaining their welfare.

Ideally, if we had panel data we could control for unobserved heterogeneity and past history of individuals and test these assumptions. Unfortunately panel data on consumption are very seldom. We could also construct quasi-panel data, but these are also difficult to construct since we need observe consumption each year. In most of the cases we can benefit from repeated cross-sections not evenly spaced. In this context in order to recover some of the structural parameters of the model, one natural thing to do is to adopt a conditional preferences approach and derive a conditional demand system with retirement as a conditioning variable. This approach is problematic. Actually, standard econometric techniques will fail to identify the parameters of interest if the existence of unobserved heterogeneity in the preferences of the individuals impacts the retirement decision. This is what we show in this paper.

The idea of this paper is to find economic assumptions which can help to identify the substitutability between consumption and leisure in the context of the estimation of demand systems conditioned on the labour participation (working or retired). We model consumption around the age of retirement, where we assume non-separabilities between consumption and leisure and treat retirement as an endogenous variable. We discuss the identification of the structural parameters of the model with cross-section data when some structural parameters vary among the population. We assume the existence of fixed costs of work and discuss their impact on retirement. People who have a higher fixed costs are more likely to retire.

We show that if we estimate the model by conditioning on retirement status, the OLS estimator will be biased. We show that in the case of fixed costs to work, we can derive a lower bound for the fixed costs. We also show that traditional instrumental variables estimators will not help to obtain consistent estimates of the structural parameters of interest.

We illustrate this discussion with French Data taken from the five waves of the expenditures surveys *Enquêtes Budgets des Familles* between 1978 and 2001. We consider people who are around the age of retirement. We have found that the fixed costs represent at least 3.8% for a single and 5.5% for a couple.

The rest of the paper is organized as follows. In section 2, we present a model of consumption around the age of retirement with non-separable preferences and endogenous retirement. In section 3, we discuss the identification of the structural parameters of this model. In section 4, we describe the data used in this paper. In section 5, we estimate the model by standard techniques and provide lower bounds for the fixed costs to work. Section 6 gives some concluding comments.

2 A model of retirement with non-separable preferences

We assume that retirement is freely decided and that there is no uncertainty. People are assumed to have the following intertemporal utility function

$$\begin{aligned} V\left(c\left(t\right), c^{w}\left(t\right), R\right) &= \int_{0}^{R} u\left(c\left(t\right), c^{w}\left(t\right) - \delta; \gamma\right) e^{-\rho t} dt \\ &+ \int_{R}^{T} u\left(c\left(t\right), c^{w}\left(t\right)\right) e^{-\rho t} dt, \end{aligned} \tag{1}$$

where T is the terminal age, R is the retirement age, $c^{w}(t)$ is the consumption of commodities related to work, $c(t)$ is the consumption of other items, δ is the fixed cost of going to work, γ is the disutility of work and ρ is the subjective discount rate. The agent maximizes (1) subject to his intertemporal budget constraint

$$\int_{0}^{T} \left[c\left(t\right) + c^{w}\left(t\right)\right] e^{-rt} dt = A\left(0\right) + \int_{0}^{R} y\left(t\right) e^{-rt} dt + \int_{R}^{T} p\left(R, t\right) e^{-rt} dt, \tag{2}$$

where $A(0)$ is the initial value of the assets, $y(t)$ is the labor income at age t, $p(R,t)$ is the pension at age t with R years of work and r is the real interest rate. We define $W(R) \equiv A(0) + \int_0^R y(t) e^{-rt} dt + \int_R^T p(R,t) e^{-rt} dt$. We assume the following modified linear expenditure system, where we introduce fixed costs of going to work

$$u(c(t), c^w(t), h(t); \delta, \gamma) = \ln c(t) + \theta \ln (c^w(t) - \delta h(t)) - \gamma h(t). \tag{3}$$

The variable $h(t)$ denotes a dummy variable which is equal to 1 if the individual works and 0 if he is retired. Note that due to the presence of fixed costs, work-related consumption is non-separable from labor supply. We have the following first-order condition

$$c^w(t) - \delta h(t) = \theta c(t) \tag{4}$$

We define

$$x(t) \equiv c(t) + c^w(t) \tag{5}$$

and we get by substitution

$$c^w(t) = \frac{\theta}{1+\theta} x(t) + \frac{\delta}{1+\theta} h(t) \tag{6}$$

The solution for a given R of $c(t)$ and $c^w(t)$ are

$$\begin{aligned} c(t) &= \mu(t) [W(R) - \phi(R) \delta] \\ c^w(t) &= \theta \mu(t) [W(R) - \phi(R) \delta] + \delta h(t) \end{aligned}$$

where $\phi(R) = \left(1 - e^{-rR}\right)/r$ is a positive function increasing in R. Plugging these last two expressions in the first order condition with respect to R gives an implicit function in R and δ.

$$\gamma e^{-\rho R} = \frac{(1+\theta)\left(1 - e^{-\rho T}\right)\left\{[y(R) - p(R,R)] e^{-rR} + \int_R^T \frac{\partial p(R,t)}{\partial R} e^{-rt} dt\right\}}{\rho [W(R) - \phi(R) \delta]} \tag{7}$$

Intuitively, an increase in δ will lead people to retire earlier, but without further assumptions we cannot solve this equation. In order to give an example, we assume that $y_t = \overline{y}$ is constant and that the agent receives a pension $p = a\overline{y}$. Then equation (7) becomes

$$R = \frac{1}{r-\rho} \ln \left\{ \frac{r\overline{y}\,(1-a)\left(1-e^{-\rho T}\right)(1+\theta)}{\gamma\rho\left[\overline{y}\left(1-e^{-rR}(1-a)-ae^{-rT}\right)-r\phi(R)\,\delta\right]} \right\}.$$

By the implicit function theorem, we get

$$\frac{dR}{d\delta} = \frac{\left(1-e^{-rR}\right)}{\overline{y}\left\{e^{-rR}\left[(r-\rho)\,a-(1-a)\right]-ae^{-rT}\right\}-\delta\left(1-e^{-rR}+re^{-rR}\right)}$$

which is negative if $\delta > \overline{y}\left\{e^{-rR}\left[(r-\rho)\,a-(1-a)\right]-ae^{-rT}\right\}/\left(1-e^{-rR}+re^{-rR}\right)$. Note that if people are impatient ($r < \rho$), this condition is always satisfied since δ is a positive number. In the opposite case, if people are patient, this condition may be binding if $a > \left[1-e^{-r(T-R)}+r-\rho\right]^{-1}$ and $(r-\rho) > e^{-r(T-R)}$. The patience will obviously moderate the desire to retire earlier compared to impatient individuals.

3 Recovering the fixed costs to work with cross-section data

In this section, we discuss the estimation of equation (6) when we have cross-section data. The aim of the estimation is to recover the structural parameters of the model, especially the fixed costs of going to work. If only cross-section data are available, we can drop the time subscript from equation (6). We also add a constant term to this equation. The model can be written as

$$c_i^w = \kappa + \alpha x_i + \delta_i h_i + \epsilon_i \tag{8}$$

with $E\left[\epsilon_i \mid 1, x_i, h_i, \delta_i\right] = 0$, where x_i is total expenditures and $\alpha = \theta / (1+\theta)$[1]. The term ϵ_i is interpreted as a measurement error in work-related expenses. If the fixed cost is constant among the population and equal to $\overline{\delta}$, we can estimate the following equation by OLS

$$c_i^w = \kappa + \alpha x_i + \overline{\delta} h_i + \epsilon_i$$

If the fixed costs vary among the population, we could specify the following[2]

$$\delta_i = \overline{\delta} + v_i$$

with $E(\delta_i) = \overline{\delta}$ and $E(v_i) = 0$. Intuitively in order to get a consistent estimate of $\overline{\delta}$ we would assume that v_i is not correlated with income or preferences for work-related consumption, i.e. β_i should not be correlated with income or preferences for work-related expenses. We have seen in the previous section that v_i is correlated with h_i and consequently the OLS estimator of the latter regression will be biased since the error term which contains $v_i h_i$ is correlated with h_i. This problem is easily dealt within the context of random coefficient models if v_i is not correlated with the explanatory variables. But in the present context this is not the case since retirement is endogenous and related to the unobserved heterogeneity. Since agents are forward-looking, x_i reflects information about the future and is correlated with the decision today whether or not to retire. The OLS estimator of the Random coefficient model will be then biased. In this case a natural question arises: what kind of identifying assumptions do we need in order to deal with this correlation? Are they economically plausible?

The model can be rewritten as

$$c_i^w = \kappa + \alpha x_i + \overline{\delta} h_i + v_i h_i + \epsilon_i \tag{9}$$

We assume that below a certain threshold of fixed costs, the individual continues to work.

[1] Note that this equation is also valid if we introduce uncertainty. If we assume intertemporal separability, we can use the two-stage budgeting allocation procedure (see f.e. Blundell and Walker).

[2] This needs some restrictions on the distribution of the v since fixed costs cannot be negative.

This threshold depends on the assets, the earnings, the pension he can get, the disutility to work and the relative taste for work-related goods. The decision to continue to work can be expressed by the following reduced form equation

$$h_i = 1\left[g\left(v_i, A_i, Y_i, P_i; \theta, \overline{\delta}, \gamma\right) > 0\right] \tag{10}$$

where $g(\cdot)$ is some non-linear function, A_i are the assets held by the household, Y_i the labor income and P_i the pension. This last equation expresses the fact that at every point in time, the individual evaluates the gain between continuing to work and retiring and continue to work if the difference is positive. According to our discussion of the theoretical model, we assume that g is monotonically decreasing in v_i

$$\partial g / \partial v_i < 0 \tag{11}$$

, i.e. a higher fixed costs makes it more likely to retire.

3.1 Identification of the correlated random coefficient model

In order to illustrate the point of this section, we consider the following simplified version of our model

$$y_i = \kappa + \beta_i h_i + u_i \tag{12}$$

where h_i is a binary variable which is correlated with β_i and $E[u_i h_i] = 0$. This is a random correlated coefficient model with an endogenous binary variable (see Heckman and Vitlacyl [12], and Wooldridge [19], [20]). We consider here a simplified version of the correlated random coefficient model. We only have one treatment variable and the intercept is constant. Furthermore we assume

$$\beta_i = \beta + v_i \tag{13}$$

with $E[v_i]=0$. Substituting (13) into (12) ,we get

$$y_i = \alpha + \beta h_i + v_i h_i + u_i$$

First, the asymptotic bias of the OLS estimator is

$$\begin{aligned} \operatorname{plim}\widehat{\beta} - \beta &= E[v|\, h=1] \\ &= E\left[v|\, g\left(v_i, A_i, Y_i, P_i; \theta, \overline{\delta}, \gamma\right) > 0\right] \end{aligned}$$

If we assume v has a symmetric distribution, $E(v)=0$ with condition (11) imply

$$E\left[v|\, g\left(v_i, A_i, Y_i, P_i; \theta, \overline{\delta}, \gamma\right) > 0\right] < 0.$$

Therefore the bias is negative and we underestimate the fixed costs to work.

If the OLS estimator of β is biased we could use instrumental variables techniques. But will IV methods solve the problem? The answer will be negative unless we are willing to make strong assumptions. The IV estimator is

$$\widehat{\beta}_{IV} = \frac{N\sum w_i y_i - \sum w_i \sum y_i}{N\sum w_i h_i - \sum w_i \sum h_i},$$

where w_i is an instrument for h_i. If $E(w_i u_i)=0$, the asymptotic bias is

$$\operatorname{plim}\widehat{\beta}_{IV} - \beta = \frac{\operatorname{cov}(w,\omega)}{\operatorname{cov}(w,h)}$$

where $\omega_i = v_i h_i$. A sufficient condition for $E(w,\omega)=0$ is $\operatorname{cov}(w, v|\, h)=0$. We also need

$$
\begin{aligned}
E\left(w_i v_i h_i\right) &= \iiint v_i w_i h_i f_{v,w,h}\left(v,w,h\right) dvdwdh \\
&= \iiint v_i w_i h_i f_{v,w,h}\left(v,\left.w\right| h\right) f_h\left(h\right) dvdwdh \\
&= \int \left[\iint v_i w_i f_{v,w|h}\left(v,\left.w\right| h\right) dvdw\right] h_i f_h\left(h\right) dh \\
&= \int E\left[\left.v_i w_i\right| h_i\right] f_h\left(h\right) dh
\end{aligned}
$$

From this last expression we see that we need conditional on h_i that w_i and v_i to be uncorrelated. We also need that $E\left(w_i h_i\right) \neq 0$. Heckman and Vitlacyl [12], and Wooldridge [19], [20] find identifying assumptions for models more general than this one which allow to use instrumental variables techniques. In order to estimate the model with standard instrumental variables techniques, we have to assume the covariance between the fixed costs and the decision to retire is constant. Rewrite the model as

$$
\begin{aligned}
\beta_i &= \mathbf{z}_i' \alpha_\beta + v_i \\
h_i &= \mathbf{w}_i' \alpha_h + e_i
\end{aligned}
$$

We need the following assumption to identify β

$$
E\left[\left.v_i e_i\right| \mathbf{z}_i, \mathbf{w}_i\right] = k
$$

where k is a constant. Heckman and Vytlacil propose GMM estimators. Unfortunately this assumption will unlikely hold. Since h_i is a non-linear function, the model will be nonseparable. Furthermore we need to find instruments for retirement and they will be difficult to find in this context. We then prefer to consider the OLS estimator of this random coefficient model and compute its bias and try to see whether we can sign it.

3.2 Bias of the OLS estimator

Intuitively since we are comparing work-related expenses between those who work and those who are retired, the difference will reflect the vanishing of fixed costs of work but also the fact that people who have not yet retired earlier have a lower fixed cost of going to work than the average. We estimate equation (14) by OLS

$$c_i^w = \kappa + \alpha x_i + \overline{\delta} h_i + v_i h_i + \epsilon_i \tag{14}$$

We assume x_i is measured without error and that $E\left[\epsilon|\, h\right] = E\left[\epsilon\right] = 0$. According to Kolodziejczyk [16], the asymptotic bias is equal to

$$\begin{aligned} \operatorname{plim} \widehat{\delta}_{OLS} - \overline{\delta} &= E\left[v|\, h=1\right] \\ &+ \frac{\operatorname{cov}\left[v, x|\, h=1\right]\left[E\left(x|\, h=0\right) - E\left(x|\, h=1\right)\right] P\left(h=1\right)}{V\left(x\right) - \left[E\left(x|\, h=0\right) - E\left(x|\, h=1\right)\right]^2 P\left(h=0\right) P\left(h=1\right)} \end{aligned}$$

and is negative[3] if v is distributed symmetrically[4],

$$E\left(x|\, h=1\right) > E\left(x|\, h=0\right)$$

and

$$\operatorname{cov}\left[vx|\, h=1\right] > 0.$$

From our theoretical model x is correlated with v. The model predicts a drop in consumption at retirement, i.e. we have $E\left(x|\, h=1\right) > E\left(x|\, h=0\right)$. Again according to the model, we have $\operatorname{cov}\left[vx|\, h=1\right] > 0$. Conditional on the fact the agents are not yet retired a higher fixed costs is associated with a higher total expenditures, this is also an implication of the model.

The OLS estimator will be downward biased and will give a lower bound for the true

[3]By the Cauchy-Schwarz inequality, we alos have $V\left(x\right) - \left[E\left(x|\, h=0\right) - E\left(x|\, h=1\right)\right]^2 P\left(h=0\right) P\left(h=1\right) > 0$.

[4]if v is distributed symmetrically, we have $E\left[v|\, h=1\right] < 0$.

fixed costs to work since we tend to underestimate them. The terms $P(h=1)$, $P(h=0)$, $V(x)$ and $E(x|\, h=0) - E(x|\, h=1)$ are non-parametrically identified. We maintain the assumptino that $\text{cov}[v, x|\, h=1] > 0$ holds. The main conclusion is then that the OLS estimate of the average fixed costs of working tends to underestimate the true fixed costs and gives an lower bound for the latter.

4 Empirical analysis

4.1 The data

We have used cross-sections data from French family expenditure surveys. These surveys contain data on consumption, labour supply and households characteristics (education, occupation status, number of members, etc.) and is suitable for our analysis. In these surveys we find the usual groups of goods such as food, tobacco and alcohol, clothing, housing, furniture, transports, communication, leisure and education. We also find data on non-consumption items like insurance or taxes. The size of the samples should be sufficiently large to ensure that we observe enough people retired or close to retirement. This source of data is taken from the French Family expenditure survey "Enquêtes sur les Budgets des Familles" which has been conducted by the French National Institute of Statistics (INSEE) every five years since 1978. Up to now there are five waves available. In the appendix we provide summary statistics for these data.

Consumption data should be reliable since households have to fill in a diary. In order to avoid seasonality of expenditures the surveys are conducted over different households samples at different periods during the year of interview, usually a month. We observe people from 1978 until 2001. Our measure of consumption is

$$\frac{x}{S(\mathbf{p}, \mathbf{Z})}$$

where x is total expenses on non-durable goods and $S(\mathbf{p}, \mathbf{Z})$ is a Stone price index. Non durables expenses are defined as the sum of expenses on food, tobacco & alcohol, clothing, heating, non durables for housing,health, transportation services, leisure services. We have designed a variable that account for the professional activity of the head of the household. This is also available for the retired. We can categorize them as farmers, workers, employees, white collars, craftsmen and people in intermediate activities.

In the appendix we provide some information about the French pension system.

4.2 Cohort analysis of total expenses on non-durable goods

To be completed

We have chosen in this analysis to construct cohorts with 4 years band. We have both tried to define cohorts with or without the distinction whether the head of the household left compulsory school before he/she was sixteen. For the moment we present the results where we do not make this distinction.

On figure 1, we plot the logarithm of the expenditures on non-durables goods and age for the different cohorts we chose. We see that consumption starts to decline around the age of 50.

Insert figure 1 about here

On figure 2, we plot the logarithm of non-durables expenditures divided by the Oxford equivalence scale[5] and age. We can see that the decline on total consumption is not confirmed once we, although crudely, control for the size of the household. There seems to be a dramatic decline in per-capita consumption for older cohorts. Older households may not be very representative.

Insert figure 2 about here

From figure 1 and figure 2, it seems difficult to see strong cohort effects. On figure 3, we plot the evolution of the Oxford equivalence scale and age. We see that this measure of

[5]The Oxford equivalence scale is a number of adult equivalents where the weights are 1 for the household head, 0.7 for a household member older than 14 and 0.5 for the other members.

the household size decreases form age 40. The household size explains for a large part the decline in consumption observed on figure 1.

Insert figure 3 about here

On figure 4, we plot the proportion of people retired by cohorts and by age. We see that most of the people in France retire between the age of 55 and 65.

Insert figure 4 about here

On figure 5, we plot the expenditures on work-related goods and age.

Insert figure 5 about here

On figure 6, we plot the budget share of work-related expenditures and age.

Insert figure 6 about here

4.3 Regression Analysis

Along the lines of Miniaci et al. [17], we look at the consumption behavior of different cohorts of the French households. We estimate the following equation

$$\ln C_{ht} = \sum_{b=1}^{B} \alpha_c \delta_c + \sum_{t=1}^{T} \gamma_t d_t + f\left(age\right) + \beta X_{ht} + \phi \cdot retired_{ht} + \epsilon_{ht}.$$

Miniaci et al. propose to include dummy variables for the different age bands and to interact them with a dummy for whether the head of the household is retired or not. We apply some normalization for cohort, age and time effects (see Deaton and Paxson [10], Deaton [9], Hanoch and Honig [11], Christensen [7]).

Once we have controlled for cohort, time and age effects, both the levels of consumption and income are lower for young retired and higher for old retired. There does not seem to be differences between people who are retired and those who are not. We may explain this by the fact that people who retire later may be richer on average. People who are more educated tend to arrive later in the labor market and have to contribute longer to the pension system to get a full pension (pay as you go system) and so retire later.

We have regressed both the level and the logarithm of non-durables consumption on a set of cohort, age and time dummies, and demographic variables. On table 1 we find the results for the level of expenses on non-durables and on table 2 the results for the logarithm of expenses on non-durables.

Insert Table 1 about here

Insert Table 2 about here

In both cases, we have found that expenses on non-durables are lower for people retired. We have interacted the dummy for retirement with age dummies. We have controlled for the profession of the head of the household and for the education (general and professional).

We have reported on table 3, the estimates of the time, cohort and age dummies for specification (5) and (6) of respectively table 1 and 2. Age effects and time effects are present, but surprisingly we did not find strong cohort effects. After correcting for these effects and for other demographics like the household size and the professional activity of the head, we found that the households consume on average 6.9% less if the head is retired and 11% if the spouse is retired compared to a working household according to the figures of table 2. Note that we cannot interpret this as a non-optimal consumption drop, since we do not observe the marginal utility of wealth.

Insert Table 3 about here

Even though we cannot say whether the variation in consumption is optimal or not, we can establish that there is clearly a drop in consumption at retirement. This is important to establish since we have seen that this drop in consumption will halp us to sign the bias of the estimator of fixed costs to work.

4.4 Work-related expenses

We have regressed work-related expenses on total expenses on non-durables goods, cohort effects, age effects and time effects. For the latter we have applied the normalization used by Deaton and Paxson (see Deaton and Paxson [10], Miniaci et. al. [17] and Christensen [7]) and the demographic composition of the households. The results are reported on table Work-related expenses consist in transportation, clothing and meals out of home. We find that work-related expenses decrease when people are retired compared to when they are not. We have instrumented the total expenses on non-durables with the income of the household and the income squared. We might conclude that there are non-separabilities between consumption and labor supply among French households. We have found that these fixed costs of going to work represent at least 3.8% of the total expenses on non-durable goods for singles and 5.5% for couples.

Insert Table 4 about here

We have also regressed the budget share of work-related expenses on the logarithm of non-durable goods on expenses and the dummies for cohort, age and time effects. The instruments for the log of non-durables expenses are the log of income and the of income squared. This corresponds to a Working-Leser specification (see Miniaci et. al. [17] and Christensen [7]). We found that the budget share decreases significantly when the head of the household is retired. A Working-Leser specification seems to fit better the data, but the dummy variable on retirement status is more difficult to interpret. We would need to introduce fixed costs of work in a Working-Leser demand system in a similar and coherent way as in the LES specification we used in section 2. We have reported on table 6, the estimates of the time, cohort and age dummies for specification (4) of both table 4 and 5. Again we did not find significant cohort effects.

Insert Table 5 about here

Insert Table 6 about here

On table 7, we present regressions of consumption where we have interacted the dummy for retirement of the head of the household with his age. We see that there are variations with the age of the "drop" in consumption at retirement. We have found that these dummies are significant for people aged between According to table 7, this drop seems to increase with age 43 to 72. This phenomenon might be explained by the fact that the proportion of people retired increase with age, leading to a lower bias. After this age, there is an increase in work-related expenses but this one is statistically insignificant. These aged people might not be representative.

Insert Table 7 about here

5 Conclusion

In this paper we have built a life-cycle model where retirement is endogenous. We have considered a model with a within-period demand system with three goods which are work-related consumption, non-related to work consumption and labour supply. We have introduced fixed costs to work and derived an equation for the work-related expenses conditional on labour supply and total expenses (conditional demand function). We have also shown that the retirement decision is more likely for people with a high fixed costs.

We have shown that when we estimate the conditional demand for work-related consumption and retirement is an endogenous decision, we need to assume that the fixed costs to work are homogenous in the population in order to interpret the parameter on the dummy for retirement as a consistent estimate of the true fixed costs. If there is unobserved heterogeneity in the fixed costs to work, then we will introduce a correlation between this later variable and the retirement status. We have shown that instrumental variables methods cannot help us to get consistent estimates because of the correlation between the heterogenous fixed costs and the decision to retire. As far as we are concerned, we have not found in the econometric literature a consistent estimator for such a random coefficient model.

We have also shown that the bias of the OLS estimator of the conditional demand equation when the fixed costs to work are heterogenous among the population, is negatively biased. The intuition behind this result is that people who have a higher fixed costs are more likely to retire. We established that the bias will depend on what happens to total expenses once people retire. If total expenses is lower for retired people than the bias will be negative. Since the bias is negative we underestimate the average fixed cost among the population. The OLS estimates give lower-bounds to the mean fixed costs.

As an empirical application, we used the data of the French expenditure surveys and found that there is a decrease in non-durable goods consumption when we condition on retirement status and that work-related consumption shows a significant drop in consumption when people are retired suggesting that consumption and labor supply are non-separable. We have found that the fixed costs represent at least 3.8% for a single and 5.5% for a couple. We have also found that non-durable consumption is lower for household retired and that it is lower of 6.9% for a single household and 18% for a couple.

6 Appendix

6.1 Solving the model

The Lagrangian is equal to

$$\Omega\left(c\left(t\right),c^{w}\left(t\right),R\right)=V\left(c\left(t\right),c^{w}\left(t\right),R\right)+\lambda\left[W\left(R\right)-\int_{0}^{T}\left[c\left(t\right)+c^{w}\left(t\right)\right]e^{-rt}dt\right]\tag{A1}$$

We assume the following modified linear expenditure system, where we introduce fixed costs of going to work

$$u\left(c\left(t\right),c^{w}\left(t\right),h\left(t\right);\delta,\gamma\right)=\ln c\left(t\right)+\theta\ln\left(c^{w}\left(t\right)-\delta h\left(t\right)\right)-\gamma h\left(t\right).\tag{A2}$$

The first-order condition is

$$
\begin{aligned}
\frac{\partial \Omega}{\partial R} &= \frac{\partial V}{\partial R} + \lambda \frac{\partial W}{\partial R} = 0 && \text{(A3)} \\
\frac{\partial \Omega}{\partial c_t} &= \frac{e^{-\rho t}}{c_t} - \lambda e^{-rt} = 0 && \text{(A4)} \\
\frac{\partial \Omega}{\partial c_t^w} &= \frac{e^{-\rho t}}{c_t^w - \delta h_t} - \lambda e^{-rt} = 0 && \text{(A5)}
\end{aligned}
$$

Using (A2), condition (15) becomes

$$
\begin{aligned}
\frac{\partial \Omega}{\partial R} = {} & \{\theta [\ln (c_R^w - \delta) - \ln (c_R^w)] - \gamma\} e^{-\rho R} \\
& + \lambda \left\{ [y(R) - p(R,R)] e^{-rR} + \int_R^T \frac{\partial p(R,t)}{\partial R} e^{-rt} dt \right\}
\end{aligned} \tag{A6}
$$

We get

$$
c^w(t) - \delta h(t) = \theta c(t) \tag{A7}
$$

Using equations (15), (A7) and the budget constraint, we can solve for the marginal utility of wealth λ and find

$$
\frac{1}{\lambda} = \frac{\rho}{(1+\theta)(1-e^{-\rho T})} \left[W(R) - \delta \frac{1-e^{-rR}}{r} \right] \tag{A8}
$$

We obtain

$$
\begin{aligned}
c(t) &= \mu(t) [W(R) - \phi(R)\delta] && \text{(A9)} \\
c^w(t) &= \theta \mu(t) [W(R) - \phi(R)\delta] + \delta h_t && \text{(A10)}
\end{aligned}
$$

where $\mu(t) = \rho e^{-(\rho - r)t} / (1+\theta)\left(1-e^{-\rho T}\right)$ and $\phi(R) = \left(1 - e^{-rR}\right)/r$. By substituting (15) and (15) into (15), we obtain an implicit function in R and δ, i.e.

$$
\gamma e^{-\rho R} = \frac{(1+\theta)\left(1-e^{-\rho T}\right) \left\{ [y(R) - p(R,R)] e^{-rR} + \int_R^T \frac{\partial p(R,t)}{\partial R} e^{-rt} dt \right\}}{\rho [W(R) - \delta \phi(R)]} \tag{A11}
$$

If we assume that $y_t = \overline{y}$ is constant and that the agent receives a pension $p = a\overline{y}$, $W(R) = \overline{y}\left(1 - e^{-rR}(1-a) - ae^{-rT}\right)$. Equation (7) becomes

$$R = \frac{1}{r-\rho}\ln\left\{\frac{r\overline{y}(1-a)\left(1-e^{-\rho T}\right)(1+\theta)}{\gamma\rho\left[\overline{y}\left(1-e^{-rR}(1-a)-ae^{-rT}\right)-\delta\left(1-e^{-rR}\right)\right]}\right\}.$$

By the implicit function theorem, we get

$$\frac{dR}{d\delta} = \frac{\left(1-e^{-rR}\right)}{\overline{y}\left\{e^{-rR}\left[(r-\rho)a-(1-a)\right]-ae^{-rT}\right\}-\delta\left(1-e^{-rR}+re^{-rR}\right)}$$

which is negative if $\delta > \overline{y}\left\{e^{-rR}\left[(r-\rho)a-(1-a)\right]-ae^{-rT}\right\}/\left(1-e^{-rR}+re^{-rR}\right)$ .if people are impatient ($r < \rho$), this condition is always satisfied since δ is a positive number. In the opposite case, if people are patient, this condition may be binding if $a > \left[1-e^{-r(T-R)}+r-\rho\right]^{-1}$ and $(r-\rho) > e^{-r(T-R)}$.

6.2 The French retirement system

In this section we give an overview of the French pension system. For a brief description of the French retirement system one can refer to Blanchet and Pelé [3] and Mahieu and Blanchet [18] and this section is inspired by these two references. The French pensions are characterized by a pay as you go system. The wage earners of the private sector benefit from a General regime and a Complementary regime. The regime for the civil servants is paid by the State budget. Self-employed are under a special scheme. The basic general scheme offers benefits corresponding to the share of gross wages below a social security ceiling (2352 euros per month in 2002). Complementary schemes are organized on a occupational basis. They consist of a large number of specific schemes (about 180) organized by 2 associations. These are the *Association Générale des Institutions de Retraite des Cadres* (AGIRC) which deals with the executive workers and applies to the fraction of their wages over the ceiling and the *Association des Régimes de Retraite Complémentaire* (ARRCO) for other workers' and executives wages below the ceiling. These two schemes provide around 40% of pensions of wage earners in the private sector. Receiving a complementary pension is conditioned on receiving benefits from the general scheme.

The rules for the general regime of the wage earners in the private sector are as follows. The pension depends on the number of quarters of contribution and on the average wage of the D best years of the pensioner career. D has changed over time but seems to be nowadays 10 years. The pension is computed by the following formula

$$\begin{aligned}\text{Pension} &= \alpha \times \left(\frac{\min\left(\text{Number of quarters of contributions,150}\right)}{150}\right) \\ &\quad \times \left(\text{average wage of the best D years}\right)\end{aligned}$$

The coefficient α is maximal when people attain age 60 with 150 quarters (37.5 years) of contributions or when people attain age 65 independently of the number of years of contributions. In all other cases α is decreased by 1.25 percentage point for each year missing either to reach 150 quarters or age 65. The most favorable outcome to the pensioner is taken into account.

Under the complementary regime, wage earners have to accumulate points during their career in proportion of their contributions. Their value is set every year. The pension at time t for a worker who has begun its career at t_0 and stopped at t_1 is equal to

$$\text{Pension} = V\left(t\right) \sum_{t'=t_0}^{t_1} \frac{\tau\left(t'\right) w\left(t'\right)}{RW\left(t'\right)}$$

where $V\left(t\right)$ is the value of the point at time t, $\tau\left(t'\right)$ is the contribution rate, $w\left(t'\right)$ is the wage and $RW\left(t'\right)$ is the reference wage or the price of the point at time t'.

Civil servants have a unique pension scheme financed by the state budget. People can claim their pension at age 60 if they have at least 15 years of service. A rather large minority can claim at age 55 (primary-school teachers, policemen, prison officers). The formula is

$$\begin{aligned}\text{Pension} \quad &= \quad 0.75 \times \left(\frac{\min\left(\text{Number of quarters of contributions,150}\right)}{150}\right) \\ &\quad \times \left(\text{last gross wage, excluding bonuses}\right).\end{aligned}$$

Each year worked entitles the civil servants a 2% annuity which is truncated to 75%. There are provisions for women who have bred children. Mandatory retirement for civil servants occurs at age 65 with exceptions for militaries (below) or academics (age 68).

Two reforms of the retirement system occurred, one in 1983 and the other in 1993. In 1983, the allowance to retire at age 60 in the general regime was generalized. Before that date the retirement age was 65. In 1993, another reform of the general regime was introduced. First, pensions will be indexed on prices rather than on wages. Second, retirement at age 60 will still be possible but the number of years of contribution was planned to be increased to 40 years from 2003. Finally, since 2008 the reference wage will take into account the best 25 years instead of 10.

First, we must note that there is some flexibility in the retirement decision at least between 60 and 65. Second, there are clearly different incentives to retire for wage earners of the private sector and civil servants. Transition in retirement seems to be fast. Most of the transition seem to occur in five years, since we have quite sharp transitions from employment to retirement (remind that surveys are performed approximately every five years). There might be demand-side effects linked to early retirement and unemployment insurance. A firm is not allowed to lay off a worker because of his/her age, but it can constrain the worker to retire if he/she has got a full pension. The duration of the unemployment insurance benefits is limited, but this rule does not apply to people over the age of 55. They can benefit from the unemployment insurance until they retire. As a consequence, some people which are registered as unemployed may be in fact early retired.

6.3 Summary statistics

Insert Table A1

References

[1] Banks, James, Blundell, Richard, Tanner, Sarah (1998), "Is There a Retirement Puzzle?", American Economic Review 88, 769-788

[2] Bernheim, Douglas, Skinner, Jonathan, Weinberg, Steven (2001), "What Accounts for the Variation in Retirement Wealth Among U.S. Households?", *American Economic Review*, vol. 91, No. 4, 832-857.

[3] Blanchet, Didier, Pelé, Louis-Paul (1999), "Social Security and Retirement in France" in *Social Security and Retirement around the World,* Ed. Gruber Johnathan and Wise David A., The University of Chicago Press, Chicago, pp. 101-133.

[4] Browning, Martin, Lechene, Valérie (2003), "Children and Demand: Direct and Non-Direct Effects", Review of Economics of the Household 1, 9-31.

[5] Browning, Martin, Meghir, Costas (1991), "The Effects of Male and Female Labor Supply on Commodity Demands", Econometrica 59, 925-951

[6] Card, David (2001), "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems", Econometrica 69, 1127-1160

[7] Christensen, Mette (2004), "Demand Patterns Around Retirement: Evidence from Spanish panel data", mimeo.

[8] Cogan, John F. (1981), "Fixed Costs and Labor Supply", Econometrica 49, 945-963

[9] Deaton, Angus (1985), "Panel Data from Time Series of Cross-sections", Journal of Econometrics 30, 109-126.

[10] Deaton, Angus, Paxson, Christina (1994), "Intertemporal Choice and Inequality", The Journal of Political Economy 102, 437-467.

[11] Hanoch, Giora, Honig, Marjorie (1985), "True Age Profiles of Earnings: Adjusting for Censoring and for Period and Cohort Effects", Review of Economics and Statistics 67, 383-394.

[12] Heckman, James, Vytlacil, Edward (1998), "Instrumental Variables Methods for the Correlated Coefficient Model: Estimating the Average Rate of Return to Schooling When the Return is Correlated with Schooling", Journal of Human Resources 30, 974, 987.

[13] Hurd, Michael (1990), "Research on the Elderly : Economic Status, Retirement, and Consumption and Saving", *Journal of Economic Literature*, Vol. 28, pp. 565-637.

[14] Hurd, Michael, Rohwedder, Susann "The Retirement-Consumption Puzzle : Anticipated and Actual Declines in spending at Retirement", NBER Working Paper No. 9586

[15] LASMAS- Institut du Longitudinal, www.iresco.fr/labos/lasmas/enquetes/enqbdf.htm

[16] Kolodziejczyk, Christophe (2006), "A Note on the Correlated Random Coefficients Model", mimeo.

[17] Miniaci, Rafaele, Monfardini, Chiara, Weber, Guiglielmo (2003), "Is There a Retirement Consumption Puzzle in Italy?", IFS Working Paper

[18] Mahieu, Ronan, Blanchet, Didier (2004), "Estimating Models of Retirement Behavior on French Data", in *Social Security programs and Retirement around the World: micro-estimation,* Ed. Gruber Johnathan and Wise David A., The University of Chicago Press, Chicago, pp. 235-284.

[19] Wooldridge, Jeffrey, "Econometric Analysis of Cross-section and Panel Data", Cambridge, MIT Press, 2002

[20] Wooldridge, Jeffrey M., "Further results on instrumental variables estimation of average treatment effects in the correlated random coefficient model", Economics Letters 79, 185-191.

Table 1: Expenses on non-durables

	(1)	(2)	(3)	(4)	(5)
Number of units of consumption (Oxford scale)	4,514.325	4,470.604	3,542.789	3,889.364	3,891.316
	(100.821)**	(100.449)**	(116.596)**	(111.128)**	(111.131)**
Head retired		-2,456.208	-2,070.644	-1,332.354	-1,352.489
		(251.358)**	(246.306)**	(251.653)**	(253.706)**
Spouse retired			-1,707.795	-2,035.372	-2,040.652
			(193.933)**	(182.943)**	(183.290)**
couple			4,959.258	4,316.668	4,315.853
			(210.326)**	(207.502)**	(207.736)**
Farmers				-1,467.189	-1,480.918
				(399.355)**	(399.946)**
Craftmen				1,789.580	1,768.076
				(394.422)**	(397.875)**
White collar				9,014.664	8,982.163
				(430.986)**	(435.489)**
Intermediate activity				2,829.888	2,803.583
				(370.897)**	(373.004)**
Employees				1,528.490	1,504.499
				(377.921)**	(382.847)**
Workers (blue collar)				-1,318.904	-1,330.329
				(355.379)**	(355.484)**
Self-employed					92.313
					(205.874)
Worker public sector					-37.544
					(278.625)
Worker private sector					199.621
					(288.812)
Constant	3,038.753	3,071.721	1,928.997	1,245.364	1,244.534
	(1,059.899)**	(1,056.728)**	(1,040.739)	(976.672)	(976.752)
Observations	17240	17240	17240	17240	17240
R-squared	0.23	0.23	0.25	0.34	0.34
Adjusted R-squarred	0.23	0.23	0.25	0.34	0.34

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 2: log of non-durables expenses

	(1)	(2)	(3)	(4)	(5)	(6)
Log of number of units of consumption	0.787	0.781	0.584	0.638	0.638	0.639
	(0.012)**	(0.011)**	(0.014)**	(0.014)**	(0.014)**	(0.014)**
Head retired		-0.139	-0.120	-0.063	-0.063	-0.069
		(0.014)**	(0.015)**	(0.016)**	(0.016)**	(0.016)**
Spouse retired			-0.088	-0.107	-0.107	-0.109
			(0.009)**	(0.009)**	(0.009)**	(0.009)**
couple			0.327	0.270	0.270	0.271
			(0.014)**	(0.013)**	(0.013)**	(0.013)**
Farmers				-0.037	-0.037	-0.042
				(0.029)	(0.029)	(0.029)
Craftmen				0.190	0.190	0.180
				(0.026)**	(0.026)**	(0.026)**
White collar				0.573	0.573	0.560
				(0.026)**	(0.026)**	(0.026)**
Intermediate activity				0.313	0.313	0.303
				(0.025)**	(0.025)**	(0.025)**
Employees				0.180	0.180	0.170
				(0.026)**	(0.026)**	(0.026)**
Workers (blue collar)				0.010	0.010	0.007
				(0.024)	(0.024)	(0.024)
Self-employed						0.042
						(0.011)**
Worker public sector						0.017
						(0.018)
Worker private sector						0.047
						(0.016)**
Constant	8.730	8.731	8.669	8.559	8.559	8.560
	(0.057)**	(0.054)**	(0.056)**	(0.056)**	(0.056)**	(0.056)**
Observations	17240	17240	17240	17240	17240	17240
R-squared	0.33	0.34	0.36	0.44	0.44	0.44
Adjusted R-squarred	0.33	0.34	0.36	0.44	0.44	0.44

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%
Coefficients for demographics and age, cohort and time effects not shown

Table 3: Cohort, age and time effects non-durable expenses

	Expenses on non-durables	log of non-durables expenses
date of birth 1926	57.630	0.023
	(257.771)	(0.018)
date of birth 1929	73.740	0.042
	(264.436)	(0.018)*
date of birth 1932	160.737	0.046
	(307.456)	(0.020)*
date of birth 1935	113.151	0.055
	(357.904)	(0.023)*
date of birth 1938	-38.287	0.059
	(395.355)	(0.025)*
date of birth 1941	969.099	0.123
	(507.827)	(0.029)**
age between 37 and 39	1,192.012	0.072
	(650.013)	(0.036)*
age between 40 and 42	1,765.479	0.090
	(494.248)**	(0.028)**
age between 43 and 45	2,685.123	0.122
	(589.518)**	(0.032)**
age between 46 and 48	2,829.162	0.130
	(593.826)**	(0.033)**
age between 49 and 51	2,301.140	0.107
	(622.826)**	(0.036)**
age between 52 and 54	2,479.668	0.130
	(666.764)**	(0.038)**
age between 55 and 57	2,375.265	0.102
	(746.637)**	(0.042)*
age between 58 and 60	2,575.811	0.102
	(791.423)**	(0.043)*
age between 61 and 63	2,875.953	0.103
	(853.156)**	(0.048)*
age between 64 and 66	3,245.635	0.109
	(892.648)**	(0.050)*
age between 67 and 69	3,493.821	0.129
	(928.068)**	(0.053)*
age between 70 and 72	2,483.651	0.024
	(934.591)**	(0.055)
age between 73 and 75	2,095.895	-0.003
	(972.759)*	(0.059)
age between 76 and 78	1,634.432	-0.069
	(1,037.361)	(0.067)
Years 1989-1990	-481.463	-0.038
	(95.905)**	(0.006)**
Years 1994-1995	341.511	0.040
	(132.950)*	(0.008)**
Years 2000-2001	-15.976	-0.010
	(66.865)	(0.004)*
Constant	1,240.030	8.730
	(977.099)	(0.057)**
Observations	17240	17240
R-squared	0.34	0.33
Adjusted R-squarred	0.34	0.33
Hansen J-statistic :		

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 4: Work related expenses

	(1)	(2)	(3)	(4)	(5)
Expenses on non-durables	0.431	0.438	0.431	0.437	0.437
	(0.008)**	(0.009)**	(0.008)**	(0.012)**	(0.012)**
Head retired	-381.479	-357.567	-359.444	-348.666	-360.242
	(79.008)**	(78.932)**	(78.600)**	(85.710)**	(86.276)**
Number of units of consumption (Oxford scale)	-549.408	-387.747	-794.916	-682.352	-681.840
	(46.095)**	(46.870)**	(78.610)**	(94.996)**	(94.972)**
Spouse retired		-371.466	-426.520	-336.765	-339.637
		(66.895)**	(58.001)**	(68.801)**	(69.027)**
couple		-475.818		-297.010	-303.579
		(79.335)**		(96.875)**	(97.061)**
Farmers				187.995	184.801
				(134.327)	(134.375)
Craftmen				43.497	53.088
				(136.619)	(136.891)
White collar				42.798	39.637
				(187.940)	(189.075)
Intermediate activity				81.123	78.990
				(134.979)	(135.703)
Employees				157.499	162.968
				(126.258)	(127.525)
Workers (blue collar)				108.380	105.023
				(112.568)	(112.722)
Self-employed					1.314
					(73.558)
Worker public sector					-202.419
					(104.784)
Worker private sector					130.208
					(108.218)
Number of children less than 5 years old			-106.930	-160.503	
			(98.725)	(101.781)	
Number of children between 6 and 10			108.425	50.157	
			(78.378)	(81.964)	
Number of children between 11 and 15			45.627	-21.631	
			(65.452)	(71.239)	
Number of Children between 16 and 20			429.430	345.520	
			(65.288)**	(72.869)**	
Number of children between 21 and 25			645.531	555.590	
			(86.475)**	(95.870)**	
Observations	17240	17240	17240	17240	17240
Hansen J-statistic :	0.15	0.22	0.16	0.20	0.20
Adjusted R-squarred	0.68	0.68	0.68	0.68	0.68

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 5: Budget share for work related expenses

	(1)	(2)	(3)	(4)
log of non-durables expenses	0.122	0.127	0.130	0.129
	(0.004)**	(0.004)**	(0.006)**	(0.006)**
Log of number of units of consumption	-0.090	-0.066	-0.067	-0.067
	(0.004)**	(0.005)**	(0.005)**	(0.005)**
Number of people in the household working	0.001	0.001	0.001	0.001
	(0.000)*	(0.000)	(0.000)	(0.000)
Head retired	-0.026	-0.025	-0.019	-0.020
	(0.004)**	(0.004)**	(0.004)**	(0.004)**
couple		-0.029	-0.033	-0.033
		(0.004)**	(0.004)**	(0.004)**
Spouse retired		-0.013	-0.013	-0.013
		(0.003)**	(0.003)**	(0.003)**
Farmers			0.033	0.033
			(0.007)**	(0.007)**
Craftmen			0.019	0.019
			(0.006)**	(0.006)**
White collar			0.020	0.020
			(0.007)**	(0.007)**
Intermediate activity			0.023	0.023
			(0.006)**	(0.006)**
Employees			0.021	0.021
			(0.006)**	(0.006)**
Workers (blue collar)			0.024	0.024
			(0.006)**	(0.006)**
Self-employed				0.000
				(0.003)
Worker public sector				-0.012
				(0.005)*
Worker private sector				0.008
				(0.005)
Observations	16985	16985	16985	16985
Hansen J-statistic :	1.11	2.82	2.36	2.38
Adjusted R-squarred	0.21	0.21	0.21	0.21

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 6: Cohort, age and time effects work related expenses

	Work related expenses	Budget share for work related expenses
date of birth 1926	-31.787	0.002
	(87.949)	(0.005)
date of birth 1929	-51.342	0.000
	(92.944)	(0.005)
date of birth 1932	4.092	0.002
	(106.429)	(0.005)
date of birth 1935	-243.204	-0.001
	(124.581)	(0.006)
date of birth 1938	-8.983	0.007
	(135.492)	(0.007)
date of birth 1941	-216.099	0.003
	(171.651)	(0.007)
age between 37 and 39	-500.372	-0.018
	(269.464)	(0.010)
age between 40 and 42	-405.450	-0.014
	(201.544)*	(0.008)
age between 43 and 45	-843.446	-0.026
	(233.891)**	(0.009)**
age between 46 and 48	-691.319	-0.019
	(237.720)**	(0.009)*
age between 49 and 51	-1,274.426	-0.036
	(246.469)**	(0.010)**
age between 52 and 54	-1,314.512	-0.042
	(256.798)**	(0.010)**
age between 55 and 57	-1,589.105	-0.061
	(277.718)**	(0.011)**
age between 58 and 60	-1,647.624	-0.069
	(291.343)**	(0.012)**
age between 61 and 63	-1,722.216	-0.074
	(315.040)**	(0.013)**
age between 64 and 66	-1,860.570	-0.088
	(327.174)**	(0.014)**
age between 67 and 69	-2,077.020	-0.100
	(337.860)**	(0.015)**
age between 70 and 72	-2,090.550	-0.102
	(338.536)**	(0.015)**
age between 73 and 75	-2,237.932	-0.124
	(350.909)**	(0.016)**
age between 76 and 78	-2,203.466	-0.119
	(373.686)**	(0.017)**
Years 1989-1990	100.042	0.006
	(34.228)**	(0.002)**
Years 1994-1995	-175.554	-0.006
	(45.576)**	(0.002)**
Years 2000-2001	62.116	0.002
	(23.263)**	(0.001)
Constant	1,188.735	-0.848
	(357.809)**	(0.052)**
Observations	17240	16985
R-squared		
Adjusted R-squarred	0.68	0.21
Hansen J-statistic :	0.18	2.38

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 7: interactions retirement and age

	(1)	(2)
	Work related expenses	Budget share for work related expenses
Expenses on non-durables	0.433	
	(0.005)**	
log of non-durables expenses		0.124
		(0.004)**
couple	-273.040	-0.020
	(88.185)**	(0.005)**
Spouse retired	-341.737	-0.012
	(59.734)**	(0.003)**
Number of units of consumption (Oxford scale)	-664.927	
	(76.205)**	
Log of number of units of consumption		-0.079
		(0.007)**
retired age between 37 and 39	-123.918	-0.070
	(1,574.701)	(0.070)
retired age between 40 and 42	-747.586	-0.020
	(692.238)	(0.031)
retired age between 43 and 45	-547.941	-0.020
	(590.661)	(0.027)
retired age between 46 and 48	24.201	-0.019
	(431.498)	(0.019)
retired age between 49 and 51	-353.905	-0.033
	(315.115)	(0.014)*
retired age between 52 and 54	-40.604	-0.003
	(235.605)	(0.011)
retired age between 55 and 57	-161.836	-0.021
	(171.070)	(0.008)**
retired age between 58 and 60	-643.130	-0.037
	(146.040)**	(0.006)**
retired age between 61 and 63	-310.119	-0.035
	(268.988)	(0.012)**
retired age between 64 and 66	-719.781	-0.029
	(411.285)	(0.019)
retired age between 67 and 69	-892.871	-0.006
	(952.219)	(0.042)
retired age between 70 and 72	-1,018.225	-0.094
	(1,000.637)	(0.044)*
retired age between 73 and 75	3,341.596	0.127
	(1,817.795)	(0.080)
retired age between 76 and 78	504.686	0.014
	(3,142.778)	(0.139)
Observations	17240	16985
Hansen J-statistic :	6.25	3.18
Adjusted R-squarred	0.68	0.22

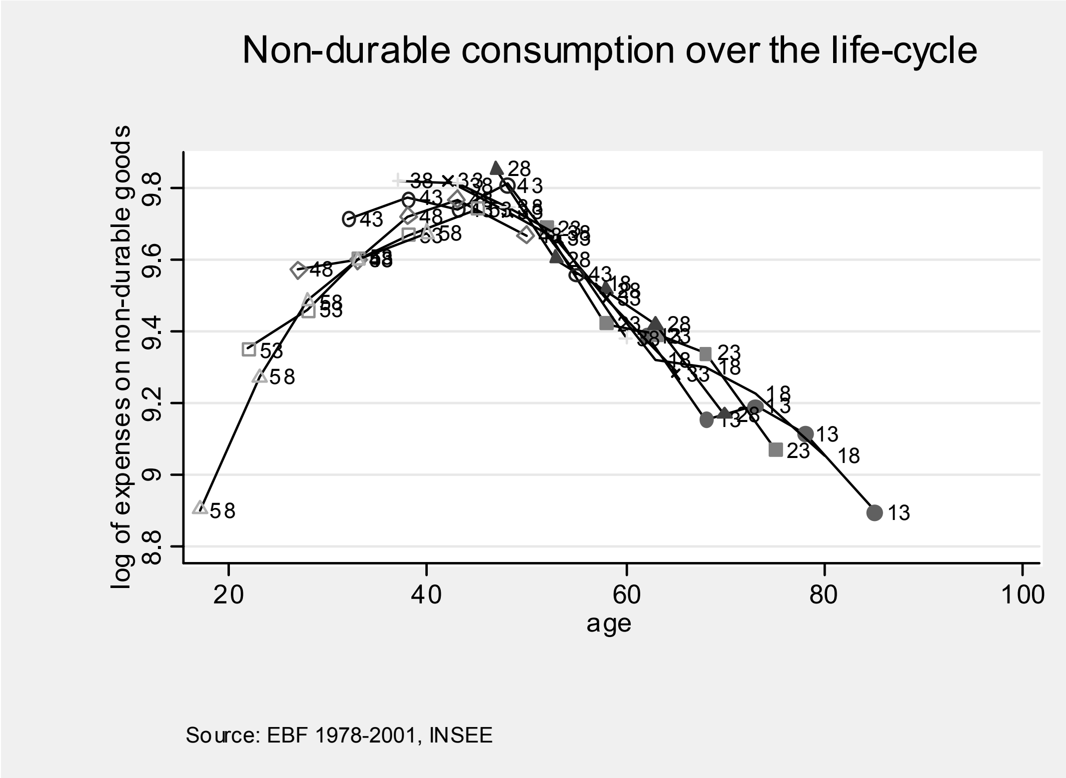
Standard errors in parentheses

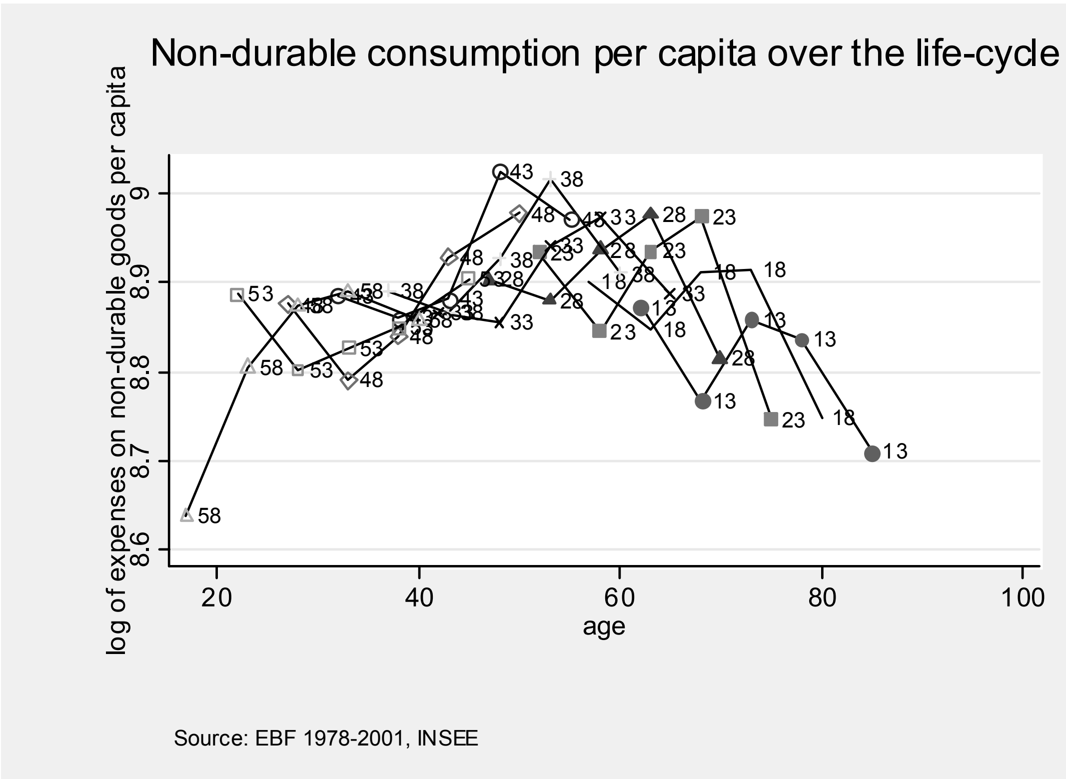
* significant at 5%; ** significant at 1%

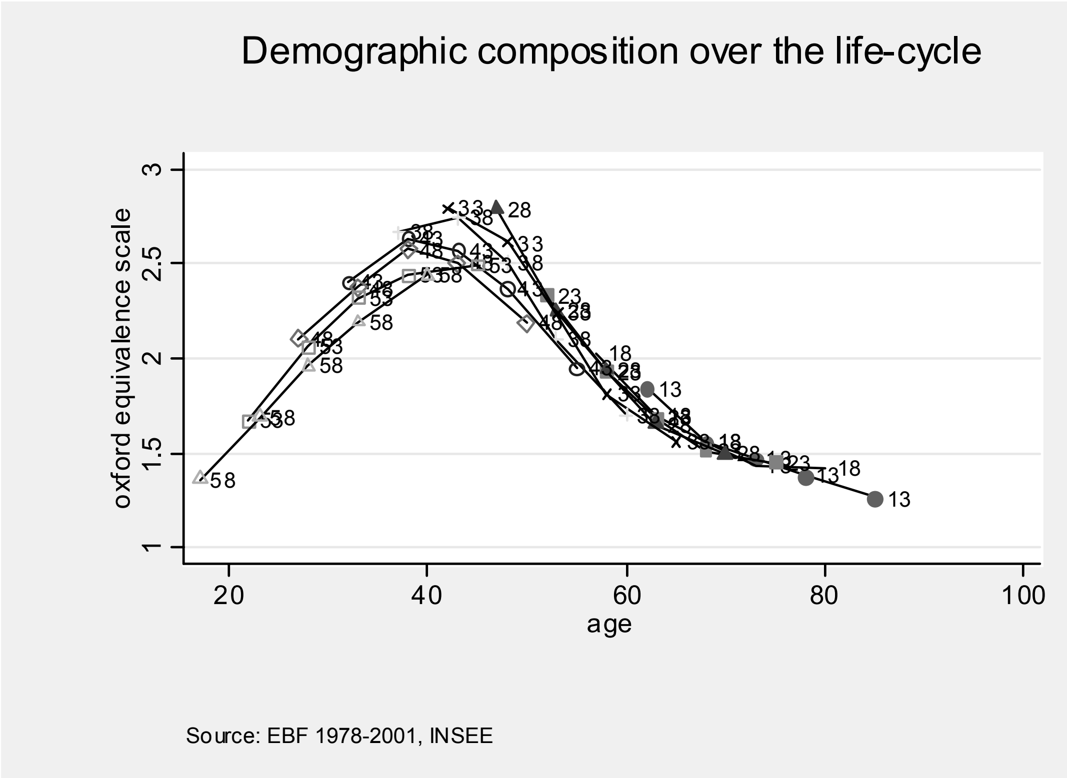
Table A1: Summary Statistics

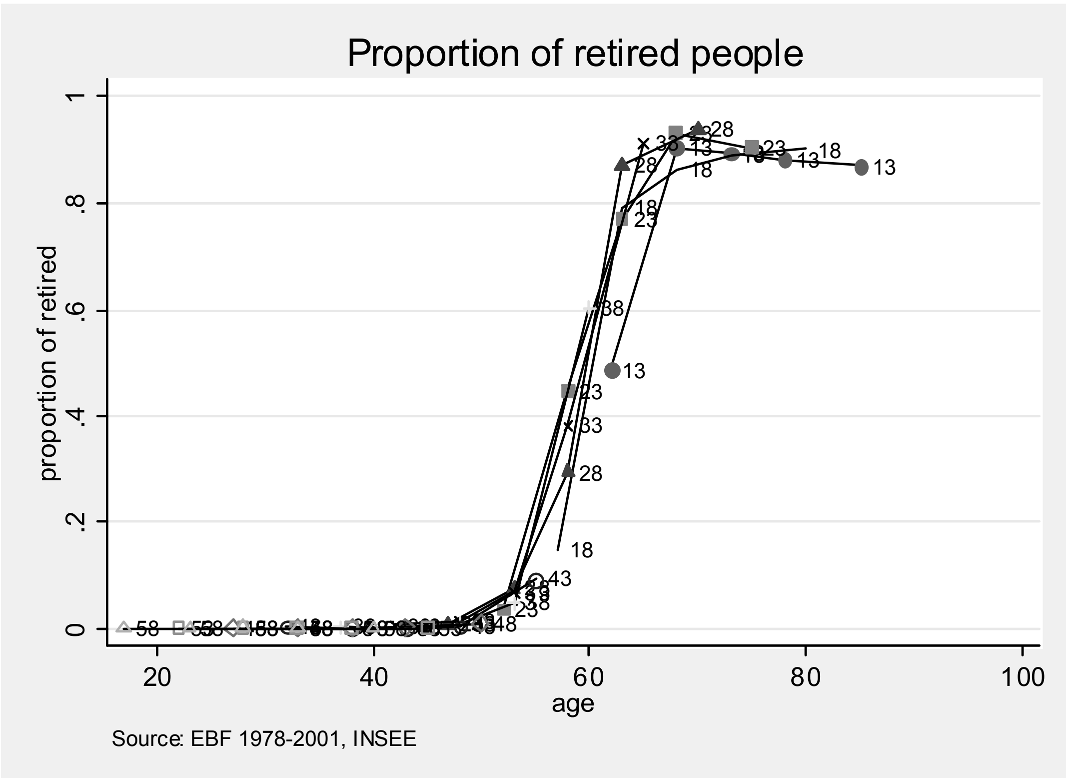
variable	mean	standard-deviation
Head retired	0.41	0.49
Expenses on non-durable goods	15503.29	10635.13
Household Income	26746.97	22814.58
Work-related expenses	4747.07	5333.13
Budget share work-related expenses	0.26	0.16
Farmers	0.07	0.26
Craftmen	0.17	0.38
White collars	0.12	0.33
Intermediate activity	0.15	0.35
Employees	0.11	0.31
Workers	0.32	0.47
Number of Units of Consumption	2.09	0.96
Age of the head of the Household	55.63	9.88
Number of Children less than 5 years old	0.05	0.28
Number of children between 5 and 10	0.12	0.41
Number of children between 10 and 15	0.21	0.54
Number of children between 15 and 20	0.27	0.60
Number of children between 20 and 25	0.14	0.43

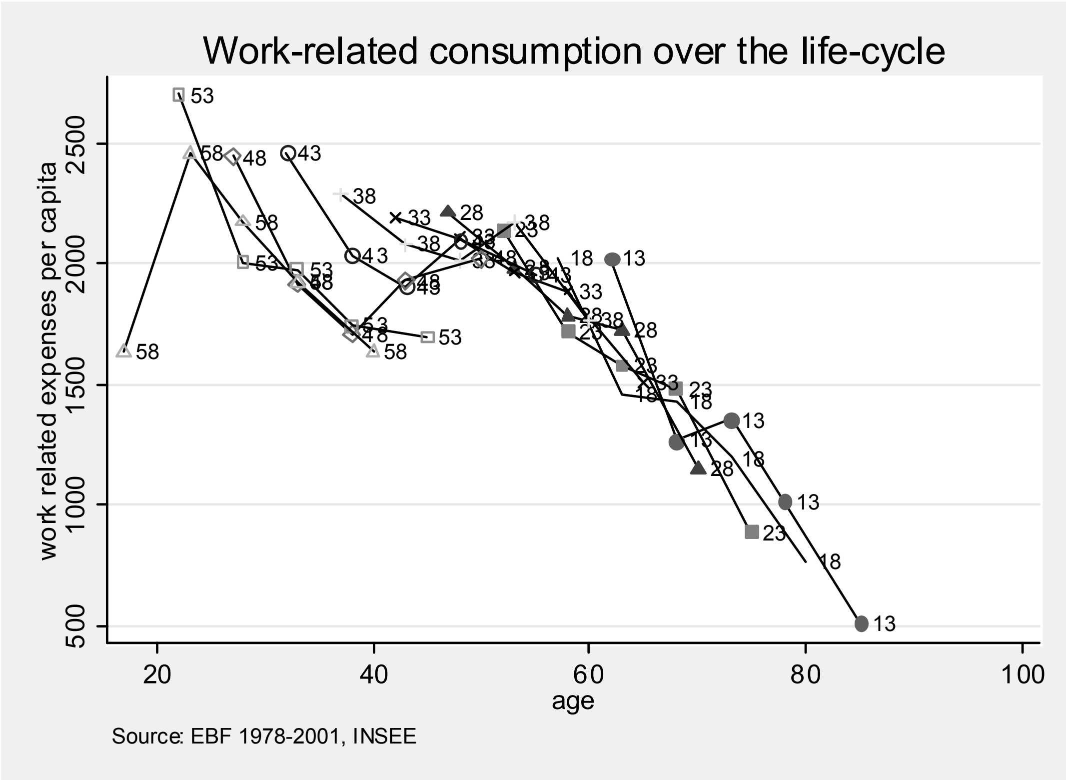
Source: Enquêtes Budgets des Familles, INSEE

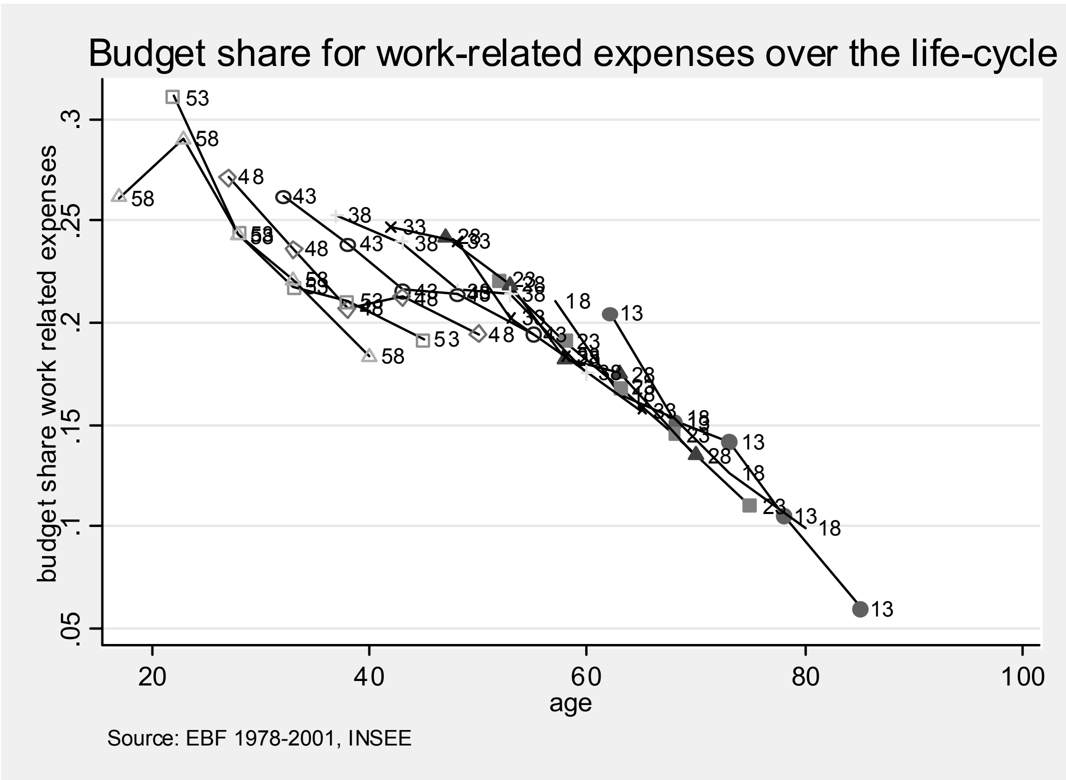

Non-durable consumption over the life-cycle
log of expenses on non-durable goods
age
Source: EBF 1978-2001, INSEE


Non-durable consumption per capita over the life-cycle
log of expenses on non-durable goods per capita
age
Source: EBF 1978-2001, INSEE


Demographic composition over the life-cycle
oxford equivalence scale
age
Source: EBF 1978-2001, INSEE


Proportion of retired people
proportion of retired
age
Source: EBF 1978-2001, INSEE


Work-related consumption over the life-cycle
work related expenses per capita
age
Source: EBF 1978-2001, INSEE


Budget share for work-related expenses over the life-cycle
budget share work related expenses
age
Source: EBF 1978-2001, INSEE